

CLAIMS

1. A method of forming a metal sheet blank, the method comprising the steps of;
 - 5 - deep-drawing the sheet blank so as to produce a deep-drawn pre-form having a base portion and a skirt portion extending at substantially right angles therefrom, the height of said skirt portion varying around the perimeter of the pre-form so as to provide a skirt having a curved edge course, and subsequently
 - 10 - processing said curved edge to obtain a curled or bent edge having a curved course.
2. A method according to claim 1, further comprising an initial step of punching the blank into circular or non-circular shape from a basic metal sheet.
- 15 3. A method according to claim 1 or 2, wherein the process steps are performed in one sequence of operations, i.e. sequentially punching the blank, deep-drawing the blank to a pre-form, and curling and/or bending the edge of the pre-form in one go.
4. A method according to any of claims 1-3, and comprising:
 - 20 - providing a first tool part having a curling portion, said curling portion forming a three-dimensional path in the tool to enable formation of said curled edge having a curved edge course,
 - providing a second tool part opposite in relation to said first tool, said second tool
 - 25 having a die cavity,
 - providing a punch in an opening in the first tool part, said punch being movable in relation to the first tool part to extend beyond a plane of the first tool part so as to be received in said die cavity of the second tool upon moving the second tool part in relation to said punch,
 - 30 - placing said sheet blank between the first and second tool part,
 - deep-drawing said sheet blank by moving the first and second tool in relation to said punch, or vice versa, so that the punch moves into said cavity of the second tool and thereby deep-draws the sheet blank into said pre-form, and subsequently
 - processing said curved edge by moving said pre-form towards the first tool part, or
 - 35 vice versa, for abutment of the curved edge of the pre-form with the curling portion to provide a curled curved edge.

5. A method according to claim 4, further comprising the step of pressing said pre-form towards the punch before the step of processing, said step of pressing being provided by mechanical or hydraulic or pneumatic means.

5 6. A method according to any of claims 2-5, wherein punching/cutting means are provided between the first and second tool part on the first and/or second tool part, the step of punching comprising moving the first tool part towards the second tool part for cutting out said sheet blank from a sheet of metal.

10 7. A method according to any of claims 1-6, wherein the sheet blank is circular or non-circular, such as polygonal.

8. A tool comprising a first tool part having a curling portion, said curling portion forming a three-dimensional path in the tool to enable formation of a curled edge on a metal pre-15 form having a curved edge course.

9. A tool according to claim 8, further comprising a cutting edge adapted to provide a sheet blank having a circular or non-circular shape from a sheet of metal and which blank is adapted to be formed into said pre-form.

20 10. A tool according to claim 8 or 9, further comprising a punch movable in an opening arranged in the first tool part, whereby the punch is movable to extend beyond a plane of the first tool part.

25 11. A tool according to claim 10, further comprising a second tool part oppositely arranged in relation to said first tool and having a die cavity adapted to receive said punch upon moving said second tool part in relation to said punch so as to allow deep-drawing of a metal sheet blank, provided between the first and second tool, into said metal pre-form.

30 12. A tool according to any of claims 8-11, wherein the cutting edge is provided on the first or second tool so as to cut out said sheet blank upon moving said first and second tool towards each other.

35 13. A tool according to any of claims 8-12, wherein the cutting edge is provided on a third tool arranged adjacent to said first and/or second tool, so as to cut out said blank upon moving said first or second tool towards said third tool.

14. A tool according to any of the claims 8-13, further comprising a second punch or piston to press the pre-form towards the first tool part or to keep the pre-form stationary while pressing the first tool part towards the pre-form for abutment of the curved edge of the metal pre-form with the curling portion to provide a curled curved edge.

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15. An apparatus for deep-drawing a metal sheet blank, said apparatus comprising a female tool part for receiving a male tool part when deep-drawing said metal sheet blank to produce a pre-form having a base portion and a skirt portion extending at substantially right angles therefrom, the height of said skirt portion varying around the perimeter of the 10 pre-form so as to provide a skirt having a curved edge course, said apparatus further comprising a curling tool for curling said curved edge.

16. An apparatus according to claim 15, wherein the curling tool comprises a curling portion forming a three-dimensional path in a tool part to enable formation of a curled 15 edge on said metal pre-form having a curved edge course.

17. An apparatus according to claim 15 or 16, further comprising cutting means for cutting the sheet blank into a circular or non-circular shape prior to deep-drawing.

20 18. An apparatus for deep-drawing a metal sheet blank and comprising a tool according to any of claims 8-14.

19. An apparatus for deep-drawing a metal sheet blank and adapted to perform the step according to the method of claims 1-7.

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20. A metal lid or container having a base portion and a skirt portion extending at substantially right angles therefrom, the height of said skirt portion varying around the perimeter of the lid or container so as to provide a skirt having a curved edge course, said curved edge further being curled.

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21. A metal lid or container having a base portion and a skirt portion extending therefrom and terminating in a curled edge, the height of said skirt portion varies around the perimeter of the lid or container.

35 22. A metal lid or container according to claim 20 or 21, wherein said height is in the range of 0 to 20 cm.

23. A metal lid or container according to any of the claims 20-22, wherein the lid or container has a circular, non-circular, organic or polygonal shape, or a combination of one or more shapes.

5 24. A metal lid or container according to any of the claims 20-23, and produced by the method, tool and apparatus according to any of the claims 1-19.